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内蒙古中渐新世山河狸科化石的发现

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关键词　内蒙古　中渐新统　山河狸科

内 容 提 要

本文记述了在中国内蒙古中渐新统发现的山河狸化石，共三属三种，分属三亚科：Meniscomyinae 的 *Promeniscomys sinensis*（新属、新种），Allomyinae 的 *Haplomys arboraptus* 和 Prosciurinae 的 *Prosciurus ordosicus*（新种）。原 *Prosciurus arboraptus* 应归入 *Haplomys*。这一发现表明，在渐新世中期、亚洲的山河狸已分为三支。它们与北美的关系比与欧洲的更密切。*Selenomys* 不是山河狸，仍应归入 Cricetidae 科。三盛公对岸的中渐新统属乌兰布拉格组。

一、前　　言

山河狸科（Aplodontidae）是一类中小型啮齿动物。这个科的绝大多数成员已经绝灭，只有一现生种残存在北美西部沿海潮湿地区。它们的身材粗壮，四肢短小，具有非常短小的尾；耳朵和眼睛也很小，是一种穴居类型。山河狸的化石最早可以追溯到北美晚始新世。从渐新世开始，它广泛分布在亚洲、欧洲和北美广大地区。但山河狸化石在北美和欧洲渐新统中发现较多，而在亚洲渐新统中则发现较少，仅在苏联哈萨克斯坦和蒙古 Tatal Gol 等地中渐新统发现了很少的化石，就是这些化石的分类地位也还存在不少问题。而在中国境内的下第三系中还未发现过山河狸化石。

1977 年古脊椎动物与古人类研究所一野外队在内蒙古伊克昭盟杭锦旗西缘发现了山河狸化石。这是山河狸化石在我国渐新统中首次发现。化石材料虽少，但这一发现不但增加了已知山河狸的种类，扩大了分布范围，更主要的是对了解亚洲渐新世山河狸的特点和分类位置，以及它们与北美和欧洲的山河狸的关系都有重要意义。

美国华盛顿大学 Burke 博物馆 J. M. Rensberger 博士和美国自然历史博物馆的 R. H. Tedford 博士及时送给笔者研究对比需要的模型，胡惠清同志绘图，欧阳莲同志照相，在此表示衷心的感谢！

二、系 统 描 述

Aplodontoidea Matthew, 1910

Aplodontidae Trouessart, 1897

Meniscomyinae Rensberger, 1981

原新月鼠（新属）*Promeniscomys* gen. nov.

属型种　***Promeniscomys sinensis* gen. et sp. nov.**

属的特征　一种个体较小，较原始的山河狸，大小与 *Prosciurus* 相近。颊齿齿冠低，齿尖较齿脊发达；原小尖不与前边脊相连；后小尖由后脊与后尖相连，将中央谷与后唇谷分开，中央谷大，后唇谷小；原尖前臂弱；臼齿不缩短。P^4 不特别增大，前边尖大，并具前边附尖。P^4 的前附尖和上颊齿的中附尖明显，前后压缩呈脊状。外齿带很发达。

时代　中渐新世。

名称来源　Promeniscomys，意即该属是一种原始的 Meniscomyinae.

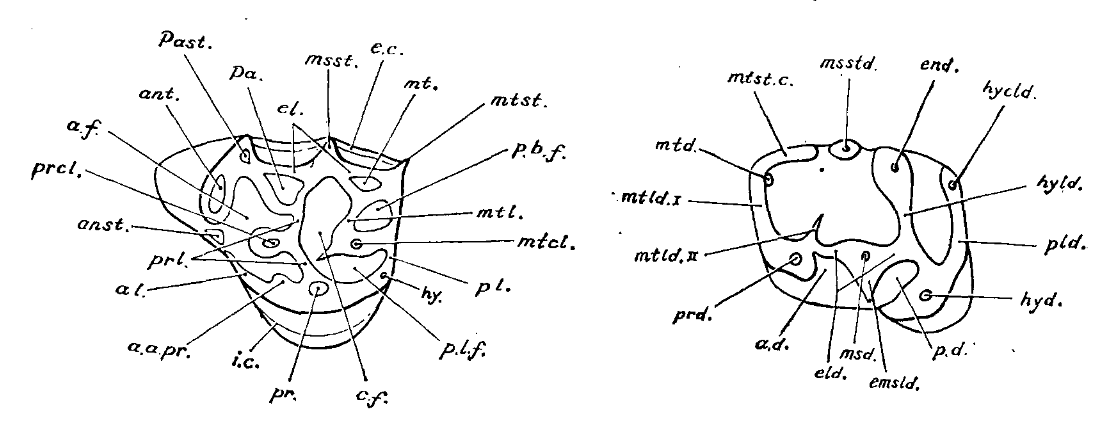


图 1　原始的山河狸的颊齿结构名称。
Fig. 1　Dental Terminology of primitive aplodontids

左：上第四前臼齿（Left: P^4）
a. a. pr.　anterior arm of protocone 原尖前臂
a. f.　anterior fossette 前谷
al.　anteroloph 前边脊
anst.　anterostyle 前边附尖
ant.　anterocone 前边尖
c. f.　central fossette 中央谷
e. c.　external cingulum 外齿带
el.　ectoloph 外脊
hy.　hypocone 次尖
i. c.　internal cingulum 内齿带
msst.　mesostyle 中附尖
mt.　metacone 后尖
mtcl.　metaconule 后小尖
mtl.　metaloph 后脊
mtst.　metastyle 后附尖
pa.　paracone 前尖
past.　parastyle 前附尖
p. b. f.　posterior buccal fossette 后唇谷
pl.　posteroloph 后边脊
p.l. f.　posterior lingual fossette 后舌谷
pr.　protocone 原尖
prcl.　protoconule 原小尖
prl.　protoloph 原脊

右：下臼齿（Right: lower molar）
a. d.　anterior depression 前凹
eld.　ectolophid 下外脊
emsld.　ectomesolophid 下外中脊
end.　entoconid 下内尖
hycld.　hypoconulid 下次小尖
hyd.　hypoconid 下次尖
hyld.　hypolophid 下次脊
msd.　mesoconid 下中尖
msstd.　mesostylid 下中附尖
mtd.　metaconid 下后尖
mtld. I　metalophid I 下后脊 I
mtld. II　metalophid II 下后脊 II
mtst. c.　metastylid crest 下后附尖脊
p. d.　posterior depression 后凹
pld.　posterolophid 下后边脊
prd.　protoconid 下原尖

中国原新月鼠(新种) *Promeniscomys sinensis* sp. nov.

(图2, 图版I, 3)

正型标本 左上颌具 P^3—M^1 (古脊椎动物与古人类研究所标本编号 V 7957)。

产地和层位 内蒙古伊克昭盟,杭锦旗罗布召西北三盛公大桥东约七公里(古脊椎动物与古人类研究所野外地点编号:77048、2);中渐新统。乌兰布拉格组。

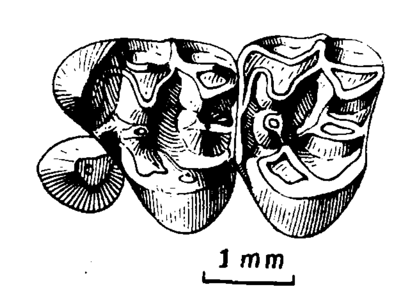


图 2 中国原新月鼠(新属、新种)
正型标本 左 P^3—M^1 (V 7957), 嚼面观
Fig. 2 *Promeniscomys sinensis* gen. et sp. nov.
Holotype: left P^3—M^1 (V 7957), occlusal view

种的特征 同属的特征。

描述 颊齿齿冠低,齿尖较发达,齿脊较细较低。

P^3 约呈圆锥形,具前、后棱, 后棱较前棱发达。

P^4 为颊齿中最大者。前尖和后尖均约呈三角锥状,外壁较平直。前边尖很大,明显向前突出,与前、后尖在同一直线上。前附尖和中附尖发达, 前后压缩呈脊状。后附尖极弱。外脊主要由前尖和后尖组成, 完全而且平直,不呈W形。中央谷大,被外脊封闭。原尖前臂明显。原小尖和后小尖均约呈前后伸长的次圆锥形。后小尖比原小尖大, 并与后边脊相连。原脊较发达,从前尖内后角经原小尖后缘伸达原尖,略呈"Z"形弯曲。后脊低而弱,连接后尖内侧和后小尖前外端,将中央谷与后唇谷分开,后唇谷小。前边附尖小,三角锥状,与前边尖以沟分开。有发达的外齿带。

M^1 前后不压缩。无前边尖和前边附尖。原脊呈 "Z" 形。后脊较 P^4 高。后小尖不但与后边脊相连,而且有脊伸达原脊。中附尖与 P^4 的相似,较发达,但前附尖和后附尖均较弱。

表 1 ***Promeniscomys sinensis* 颊齿测量**(单位: 毫米)

	P^3—M^1	P^4—M^1	P^3	P^4	M^1
长 (L.)	3.80	3.68	0.94	2.12	1.60
宽 (W.)			0.90	2.16	2.24

比较与讨论 由上面的描述可以看出, *Promeniscomys* 的上颊齿外脊平直,主要由前尖和后尖组成,前尖和后尖外壁平,中附尖前后压缩呈脊状,后小尖单一, 具前边附尖,原尖前臂较弱和无次尖等特点都与 Meniscomyinae 的一致。

Meniscomyinae 目前已知四属,均限于北美: *Meniscomys* (晚渐新世), *Niglarodon*(晚渐新世一早中新世)、*Rudiomys* (早中新世)和 *Sewelleladon* (早中新世)。其中, *Meniscomys* 在牙齿形态上与 *Promeniscomys* 最接近。 *Promeniscomys* 在中央谷明显; 后小尖与后脊相连而不与前尖或中附尖相连;后唇谷较小,与中央谷分开;原小尖不与前边脊相连;原尖前臂不很发达等特点上都与 *Meniscomys* 的相似, 而与 *Niglarodon* 等的不同。 但

Meniscomys 较 *Promeniscomys* 个体大，齿冠高，更脊形化，中央谷变小，臼齿明显缩短，P^4 相对增大等都表明 *Meniscomys* 较 *Promeniscomys* 进步。*Niglarodon* 则更进一步，它的中谷已完全消失。*Rudiomys* 只知下颊齿，无法与 *Promeniscomys* 直接比较，但它的齿冠高得多，进步得多。*Promeniscomys* 与 *Sewelleladon* 的区别就更明显。

由上面的比较可以看出，*Promeniscomys* 在颊齿形态上比 Meniscomyinae 中已知各属都原始，出现的时代最早，为中渐新世。显然 *Promeniscomys* 代表 Meniscomyinae 中出现最早的、最原始的类型。

Allomyinae Marsh, 1877
Haplomys Miller & Gidley, 1918
Haplomys arboraptus (Shevyreva), 1966

（图 3，图版 I，1）

Prosciurus arboraptus Shevyreva, 1966, p. 143;
Prosciurus arboraptus, Shevyreva, 1971, p. 79—81, fig. 6;
Prosciurus arboraptus, Kowalski, 1974, p. 154—155, P. XLIV, fig. 1—3.

材料　右 M^2 (V 7958).

地点和层位　内蒙古伊克昭盟杭锦旗罗布召西北三盛公大桥东约九公里(77049、2)；中渐新统，乌兰布拉格组。

订正特征　颊齿大小约为 *Haplomys liolophus* 的一半；齿冠低，外脊约呈W形，但中央谷唇侧在中附尖之后向外开口，使外脊中断；前尖大于原小尖；后小尖约与后尖等大，大于原小尖；原尖前臂弱；无次尖；有外齿带。

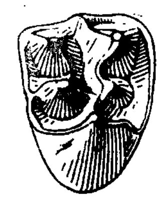


图 3　*Haplomys arboraptus*.
右 M^2 (V 7958)，嚼面观
Fig. 3　*Haplomys arboraptus*.
Right M^2 (V 7958), occlusal view

比较与讨论　V 7958 M^2 长 1.53 毫米，宽 1.96 毫米，齿冠低，后脊不与原尖相连，前尖大于原小尖，后小尖几乎与后尖等大，无次尖，前边脊较后边脊发达等特点都与 Shevyreva (1966, 1971) 描述的 *Prosciurus arboraptus* 的正型标本一致。但 Shevyreva(1971) 并未描述 *Prosciurus arboraptus* 外脊的情况，从她所绘的插图 (puc. 6)，以及 Kowalsk (1974) 所研究的蒙古的 *Prosciurus arboraptus* 的材料看，该种上颊齿存在W形外脊和穹窿状的中附尖，这一点也是与 V 7958 的一致。只是从插图看，Shevyreva 的 *Prosciurus arboraptus* 的颊齿的后小尖无明显的脊连接原脊和后边脊。但 Kowalski 的标本上是有此脊的，这和我们的标本也是一致的。因此，V 7958 应归入 *Prosciurus arboraptus*。

笔者研究比较了所有已知的 *Prosciurus arboraptus* 的材料，包括 Kowalski (1974) 曾研究过的蒙古 Tatal Gol, Nareen Bulak 和 Khatan Khayrkhan 的五个上、下颌的模型，发现 *P. arboraptus* 在上颊齿的前尖和后尖外壁较平，原脊呈"Z"形，特别是它的中附尖明显向外突，稍呈穹窿状，有约呈W形外脊的特点都与 *Haplomys* 的相似，而与 *Prosciurus* 的不同。前两者的上述相似点恰好是不同于 *Prosciurus* 的近裔共性，表明 *P. arboraptus* 与

Haplomys 有较近的亲缘关系。因此,将 *P. arboraptus* 归入 *Haplomys* 更合适些。

Haplomys 目前仅知一种 *H. liolophus*. *H. arboraptus* 与该种的区别,除了个体较小外,还在于它的外脊较弱,原尖前臂不如 *Haplomys liolophus* 的明显突出和具明显的外齿带等。*H. arboraptus* 的这些特点多半是较原始的特点,再加上 *H. arboraptus* 的时代较早,显然 *H. arboraptus* 代表较 *H. liolophus* 更原始的一种。

根据著者的描述和插图分析,MacDonald (1963, p. 176—177, 图 10)描述的? *Prosciurus dowsonae* 也不是 *Prosciurus*,而应归入 Allomyinae,很可能代表 *Haplomys* 属的另一种。

Prosciurinae Wilson, 1949

Prosciurus Matthew, 1903

鄂尔多斯原松鼠(新种) *Prosciurus ordosicus* sp. nov.

(图 4, 图版 I, 2)

正型标本 左 M^1 或 M^2 (V 7959)

产地和层位 内蒙古伊克昭盟杭锦旗罗布召西北三盛公大桥东约 5 公里(77046);中渐新统,乌兰布拉格组。

特征 大小与 *Prosciurs relictis* 相近;臼齿比例上较窄长,齿冠低;原小尖弱小,后小尖单一,约与后尖等大,原脊直,后脊斜伸达原脊,中央谷开阔,无中附尖。

描述 $M^{1/2}$ 比例上较窄长。齿冠很低。前尖和后尖约呈三角锥状,外面稍凸。后尖较低与后边脊相连。原尖与后边脊连接处膨大。原尖前臂明显。原脊完全,较直。后脊连接后尖、后小尖前缘并伸达原脊基部。原小尖很弱小。后小尖很发达,约与后尖等大,并与后边脊相连。中央谷开阔,在唇侧开口。无中附尖和外脊,也无内齿带和外齿带。长 1.76 毫米,宽 2.08 毫米。

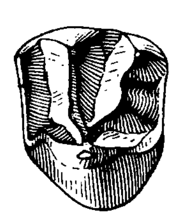


图 4 鄂尔多斯原松鼠(新种)
正型标本: 左 M^1 或 M^2 (V 7959) 嚼面观
Fig. 4 *Prosciurus ordosicus* sp. nov.
Holotype: left $M^{1/2}$ (V 7959), occlusal view

比较 V 7959 与北美中渐新世的 *Prosciurus relictus* 较相似。所不同的是, V 7959 齿冠较低,比例上相对较长,原脊直,原小尖很弱小,无中附尖和内齿带等。

V 7959 与 *Prosciurus vetustus* 的区别是,后者臼齿比例上较宽,有两个后小尖,后小尖不与原脊相连,中附尖较发达等。

Prosciurus? *shantungensis* 只有下牙,无法直接比较,但从它的较高的齿冠和牙齿结构来看,它要比 *P. ordosicus* 进步。

三、几个有关问题的探讨

（一）关于 Aplodontidae 的系统分类

1975 年 Rensberger 证明了原归入 Paramyidae 的 Prosciurinae 是一类较原始的山河狸，应属 Aplodontidae 科，并将 Aplodontidae 分成三个亚科：Prosciurinae, Allomyinae 和 Aplodontinae。但 Schmidt-Kittler 和 Vianey-Liaud (1979, p. 73—74) 认为，Rensberger (1975) 的分类只是一种水平分类，每个亚科只是相当于不同的进化阶段。并特别指出了在划分 Prosciurinae 与 Allomyinae 上的困难和一些混乱现象。因此主张将 Prosciurinae 和 Allomyinae 归入同一亚科 Allomyinae (广义)。广义的 Allomyinae 包括 *Cedromus*、*Pelycomys*、*Prosciurus*、*Plesispermophilus*、*Sciurodon*、*Haplomys*、*Allomys* 和 *Downsimus* 八属，未包括 Rensberger (1975) 原归入 Allomyinae 的 *Meniscomys*、*Ameniscomys*、*Niglarodon* 和 *Sewelleladon* 等属。1981 年 Rensberger 建立了一新亚科 Meniscomyinae，包括 *Meniscomys*, *Niglarodon* 和 *Sewelleladon* 三属。随后，Rensberger (1983) 系统研究美国 Oregon 地区的 Aplodontidae 时将 Allomyinae 和 Meniscomyinae 分开，并将 *Plesispermophilus* 归入 Allomyinae 亚科。几乎同时，王等 (Wang & Heissig, 1984) 也认为 Prosciurinae 和 Allomyinae 间仍存在明显区别，应保留为不同的亚科。也主张将 *Plesispermophilus* 由 Prosciurinae 移入 Allomyinae 亚科。

笔者认为，Prosciurinae 与 Allomyinae 和 Meniscomyinae 的区别，不仅在于它具有一些原始特征（如齿冠低，无外脊，脊和附尖不很明显等），更主要的是它还具有一些特化特征，如上颊齿前、后尖前后压缩，原脊和后脊较直，中附尖不向外突，而是向舌侧延伸等。因此，Prosciurinae 应代表不同于 Allomyinae 和 Meniscomyinae 的一支。至于 Allomyinae 和 Meniscomyinae 两亚科，除了都具有外脊和向高冠齿发展的趋势外，两者在外脊和附尖的形态，以及颊齿嚼面的结构上都很不相同，它们代表向不同方向发展的两个支系。笔者赞同 Rensberger (1975, 1981 和 1983) 的意见，将早期的 Aplodontidae 分成三个亚科：Prosciurinae、Allomyinae 和 Meniscomyinae。由于 *Plesispermophlus* 与 Allomyinae 存在许多近裔共性，而与 Prosciurinae 有明显的区别，将 *Plesispermophilus* 归入 Allomyinae 似更合适些。

（二）关于 *Haplomys* 与 Aplodontidae 科中其他各属的关系

Haplomys 是 Aplodontidae 科中较原始的一类，被 Rensberger (1975) 归入 Allomyinae 亚科。但是，后来 Rensberger (1981, 1983) 又将原归入 Allomyinae 的属分成两个亚科：Allomyinae 和 Meniscomyinae，但是并未涉及到 *Haplomys* 应归哪一亚科。笔者认为，*Haplomys* 与 *Prosciurus* 和 Meniscomyinae 亚科的较原始的属 *Promeniscomys* 虽有一些相似之处，然而 *Haplomys* 不但在具有外脊等特点上与 *Prosciurus*，以及 Prosciurinae 相区别，而且它的外脊呈W形，中附尖呈穹窿状，中央谷深入中附尖，甚至在中附尖后向外

开口，使外脊中断等特点也显然不同于 *Promeniscomys*。*Haplomys* 的这些特点表明它已初步具有 Allomyinae 的衍生性状。因此，*Haplomys* 看来应代表 Allomyinae 亚科较原始的类型.

（三）亚洲渐新世山河狸的特点

到目前为止，亚洲渐新世共有四属山河狸，代表三种不同类型，分属三个亚科：Prosciurinae 的 *Prosciurus*、Allomyinae 的 *Haplomys* 和 *Plesispermophilus*，以及 Meniscomyinae 的 *Promeniscomys*。这说明，山河狸早在中渐新世，在亚洲即已开始明显分化成三支。

Meniscomyinae 亚科的化石过去仅在北美发现过，最早出现在渐新世晚期。*Promeniscomys* 在亚洲中渐新统的发现，不但证明了 Meniscomyinae 在亚洲也存在，扩大了该亚科的分布范围，而且把 Meniscomyinae 出现的时间推前了，证明该亚科至少在中渐新世时就已存在了。特别有意义的是，这一较早较原始类型出现在亚洲，而不是在北美，表明 Meniscomyinae 可能是起源于亚洲，然后迁往北美的。

同样地，*Haplomys* 过去也只在北美上渐新统一下中新统中发现过。如果将亚洲中渐新世的 *Prosciurus arboraptus* 归入 *Haplomys* 是正确的话，*Haplomys* 不但出现的时间比原来已知的早，而且分布的范围比已知的广，说明它也不是北美的土著类型，而是早在中渐新世就已在亚洲出现了。*Haplomys* 也有可能是由亚洲起源，然后迁移到北美去的。

关于 *Prosciurus*。在 *Prosciurus lohiculus* 和 *Prosciurus arboraptus* 由 *Prosciurus* 中排除后，*Prosciurus* 属在亚洲只有第三纪中期的 *Prosciurus*? *shantungensis* 了。然而，*Prosciurus ordosicus* 的发现，肯定了 *Prosciurus* 在亚洲中渐新世时就已存在。

由上面的分析可以看出，亚洲中渐新世的四属山河狸中有三属与北美的同属或有比较密切的关系，而在欧洲却未见这三类的痕迹。唯一与欧洲共同的属是 *Plesispermophilus*。看来，亚洲渐新世的山河狸与北美的关系比与欧洲的密切。

（四）关于 *Selenomys* 的分类位置

Selenomys 是 Matthew 和 Granger 于 1923 年建立的。他们认为它的颧弓的特点与 *Cricetops* 一致，将其归入 Cricetopidae 科。1945 年，Simpson 将 Cricetopinae 作为 Cricetidae 的亚科。后来，Stehlin 和 Schaub (1951) 强调了 *Selenomys* 的牙齿的特殊性，将它作为 Cricetidae incertae sedis。Mellett (1966, 1968) 对 *Selenomys* 进行了重新研究，认为它的下颌和牙齿结构更象 Aplodontidae，将 *Selenomys* 归入 Aplodontidae。Kowalski (1974, p. 152) 也赞同 Mellett (1966, 1968) 的意见。

笔者认为，*Selenomys* 具有大的眶下孔，这和某些 Cricetidae，如 *Cricetops*、*Eucricetodon atavus* 和 *Pseudocricetodon montalbanensis* 等的一致，而 Aplodontidae 为始啮型头骨。*Selenomys* 的齿式是 $\frac{1\ 0\ 0\ 3}{1\ 0\ 0\ 3}$，与 Cricetids 的齿式是一样的，而与 Aplodontidae 的

齿式$\left(\frac{1\ 0\ 2\ 3}{1\ 0\ 1\ 3}\right)$不同。此外，*Selenomys* 的颊齿的结构特征也与 Aplodontidae 的迥然不同，而与某些仓鼠如 *Scottimus* 和 *Pliotomodon* 等的较相似。*Selenomys* 更可能是仓鼠，而不是山河狸。因此，将 *Selenomys* 保留在 Cricetidae 科里是比较合适的。

（五）关于地层的命名

1923 年德日进（Teilhard de Chardin）和桑志华（Licent）在内蒙进行考察。他们从包头沿黄河逆流而上，在现在的磴口附近，在黄河东岸发现了一批脊椎动物化石。他们把这个地点笼统地称为三盛公（Saint-Jacques）。这是根据这个化石地点的黄河对岸（黄河西岸）磴口县城南面的小镇命名的。开始他们认为这套地层的时代为上新世（Teilhard de Chardin et Licent, 1924a, 1924b），但在仔细考虑了所收集的化石以后（Teilhard de Chardin et Licent, 1924c, p. 463），他们又指出，该地区的地层实际上与蒙古的三达河组（Hsanda Gol Formation）的层位相同，时代为渐新世。德日进在专题研究该地区哺乳动物化石时(1926)进一步证实了这一点。由于这是我国第二个产渐新世哺乳动物化石的重要地点，从此以后"三盛公"就经常作为中国和亚洲渐新世地层和动物群的代表被广泛地应用。但是德日进和桑志华对这个地区的地层并未正式命名。因此，"三盛公"这一名词的含义是不清楚的。

1977 年和 1978 年我们曾两次到该地区考察。这个地区按现在的行政区划应称作：内蒙古伊克昭盟杭锦旗。化石地点位于该旗的西北角，三盛公大桥以东地区。这个地区的地层，正如德日进等（Teilhard de Chardin et Licent, 1924a, p. 40, fig. 3; 1924b, p. 73, fig. 13 和 Teilhard de Chardin, 1926, p. 7, fig. 2）的剖面图所表示的，出露不全，构造也较复杂。要根据这套地层建组是有困难的。

在邻近的千里山地区渐新统出露比较全，剖面连续，含化石丰富，各段岩层的岩性特征明显，岩层间界线清楚，可以代表这一地区渐新统的标准剖面。这儿的渐新统可分为三部分：下渐新统、中渐新统和上渐新统。笔者等(1981)根据岩性特征，在该地区建立了乌兰布拉格组和伊克布拉格组。乌兰布拉格组又分为上、下两岩性段。下段为暗红-紫红色中厚层泥岩、泥质粉砂岩、砂质、粉砂质泥岩夹桔黄色中粗一中细粒砂岩。上段为灰白一浅桔黄色中粗粒砂岩，局部为细砾岩。根据所产哺乳动物化石，乌兰布拉格组的时代为中渐新世。伊克布拉格组的岩性为浅棕红色砂质粉砂质泥岩、浅桔黄色砂岩、砂砾岩夹棕红色泥岩。所产哺乳动物化石表明其时代为晚渐新世。将三盛公附近渐新统的岩性和所含哺乳动物化石与千里山地区的比较，不但三盛公附近渐新统的岩性与乌兰布拉格组下段的相似，而且它所产哺乳动物化石组合也与乌兰布拉格组的基本一致。这表明它们可能是同一时代沉积的同一岩层单位。从岩石地层学的角度来看，三盛公附近的渐新统实际上只代表了乌兰布拉格组的一部分。

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DISCOVERY OF APLODONTIDAE (RODENTIA, MAMMALIA) FROM MIDDLE OLIGOCENE OF NEI MONGOL, CHINA

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Key words Nei Mongol; Middle Oligocene; Aplodontidae

Summary

Today only a single species of the aplodontid rodents still survives in the humid region of western North America, but in the Oligocene time the family was widespread over the Northern Hemisphere. Fossils of the Oligocene aplodontids so far have been mainly found in North America and Europe. Their occurrence in Asia is scarce. Only a few examples are known from Kazakhstan, USSR, and Mongolia. No record was known in China until 1977, when some fossil aplodontids were collected from the Middle Oligocene in Nei Mongol.

The fossils described in the present paper are all from the Middle Oligocene in the western part of Hanggin Banner (=Saint Jacques), Ih Ju League, Nei Mongol, China. They represent 3 species of 3 subfamilies, including a new genus, *Promeniscomys*, the most primitive one of the subfamily Meniscomyinae, and a new species, *Prosciurus ordosicus*. The discovery is important for our understanding of the affinity of the Asian Oligocene aplodontids and the relationships between Asian, North American and European Oligocene aplodontids.

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Systematics

Aplodontoidea Matthew, 1910

Aplodontidae Trouessat, 1897

Meniscomyinae Rensberger, 1981

Promeniscomys gen. nov.

Type species ***Promeniscomys sinensis*** **gen. et sp. nov.**

Diagnosis Small, primitive aplodontid, close to *Prosciurus* in size. Cheek teeth brachyodont, bunodont rather than lophodont. Protoconule separated from anteroloph, metaloph separates large central fossette from small posterior buccal fossette, P^4 not enlarged, molars not compressed antero-posteriorly, P^4 possessing large anterocone and distinct anterostyle, parastyle of P^4 and mesostyle of upper cheek teeth compressed antero-posteriorly, external cingulum developed.

Age Middle Oligocene.

Derivatio nominis Pro + meniscomys indicates that this is an ancestral form in the Meniscomyinae.

Promeniscomys sinensis sp. nov.

(Text-fig. 2, Pl. I Fig. 3)

Holotype Left upper jaw with P^3-M^1 (IVPP V 7957).

Locality and horizon 77048.2, 8 km. east of Sanshenggong Bridge, northwest of Luobuzhao, Hanggin Banner, Ih Ju League, Nei Mongol, China; Middle Oligocene, Wulanbulage Formation.

Diagnosis The same as that of the genus.

Comparison and discussion *Promeniscomys* agrees with Meniscomyinae in having straight ectoloph composed mainly of paracone and metacone which are flat externally, in having distinct and antero-posteriorly compressed mesostyle, single metaconule, possessing anterostyle, weak anterior arm of protocone and lacking a hypocone.

Among the genera of Meniscomyinae, *Promeniscomys* is closer to *Meniscomys* in the following features: distinct central fossette; metaconule connected with metacone, but not with paracone and mesostyle; small posterior buccal fossette separated from central fossette; the protoconule of P^4 separated from anteroloph. *Meniscomys* differs from *Promeniscomys* in being larger in size and hypsodont, having more developed lophs, small central fossette, enlarged P^4 and antero-posteriorly compressed molar. All these show that *Promeniscomys* is more primitive than *Meniscomys*. The other genera of the family, *Niglarodon, Rudiomys* and *Sewelleladon* all have more hypsodont and lophodont cheek teeth. Therefore, *Promeniscomys* is the earliest and the most primitive member of Meniscomyinae so far known.

Allomyinae Marsh, 1877

Haplomys Miller & Gidley, 1918

Haplomys arboraptus (Shevyreva), 1966

(Text-fig. 3, Pl. 1 fig. 1)

Prosciurus arboraptus Shevyreva, 1966, p. 143;
Prosciurus arboraptus, Shevyreva, 1971, p. 79—81, fig. 6;
Prosciurus arboraptus, Kowalski, 1974, p. 154—155, Pl. XLIV, fig. 1—3.

Material Right M^2 (V 7958).

Locality and horizon 77049.2, 9 km. east of Sanshenggong bridge, northwest of Luobuzhao, Hanggin Banner, Ih Ju League, Nei Mongol, China; Middle Oligocene, Wulanbulage Formation.

Revised diagnosis About half the size of *Haplomys liolophus*; cheek teeth brachyodont; ectoloph nearly W-shaped and interrupted behind mesostyle, where central fossette opens externally; paracone larger than protoconule; metaconule equal to metacone, but larger than protoconule in size; anterior arm of protocone weak, having external cingulum.

Comparison and discussion V 7958 is similar to *Prosciurus arboraptus* described by Shevyreva (1966, 1971) in size (L. 1.53 mm., W. 1.96 mm.) and tooth morphology. Shevyreva did not mention the ectoloph in her description. According to her figure (fig. 6) and Kowal-

ski's material one can surely conclude that a W-shaped ectoloph and vaulted mesostyle do exist on the upper teeth. In addition, the metaconule possesses the longitudinal crest on the upper teeth described by Kowalski (1974). All these characters are concordent with those on V 7958. Therefore, there is no doubt in referring our V7958 to *Prosciurus arboraptus*.

Having studied all the known materials of *Prosciurus arboraptus* (including the casts of upper and lower jaws from Mongolia, described by Kowalski, 1974), the author has been convinced that *Prosciurus arboraptus* is nothing else but a species of *Haplomys*. The flat external wall of paracone and metacone, Z-shaped protoloph, vaulted mesostyle, W-shaped ectoloph and longitudinal crest are all synapomorphic for both *Prosciurus arboraptus* and *Haplomys*.

Haplomys arboraptus differs from *H. liolophus* in being smaller in size, having weaker ectoloph, indistinct anterior arm of protocone and more developed external cingulum. It is more primitive than *H, liolophus*.

Judging from the tooth morphology, ?*Prosciurus dowsonae described* by McDonald (1963, p. 176—177, fig. 10) also belong to the Allomyinae and represents another species of *Haplomys*.

Prosciurinae Wilson, 1949

Prosciurus Matthew, 1903

Prosciurus ordosicus sp. nov.

(Text-fig. 4, Pl. I fig. 2)

Holotype Left M^1 or M^2 (V7959).

Locality and horizon 77046, 5 km. east of Sanshenggong Bridge, northwest of Luobuzhao, Hanggin Banner, In Ju League, Nei Mongol, China; Middle Oligocene, Wulanbulage Formation.

Diagnosis Close to *Prosciurus relictus* in size, molars brachyodont, longer in proportion, protoconule weak, single metaconule which equals metacone in size, protoloph straight, metaloph reaches protoloph, mesostyle absent.

Comparison *Prosciurus ordosicus* differs from *P. relictus* in having more brachyodont molars, which are longer in proportion, straight protoloph, weak protoconule, lacking mesostyle and internal cingulum.

Prosciurus ordosicus differs from *Prosciurus vetustus* as well. The cheek teeth of the latter are wider in proportion, possess double metaconule and developed mesostyle and lack a connection between metaconule and protoloph.

Prosciurus? shantungensis differs from *P. ordosicus* in having higher-crowned cheek teeth.

Discussion

1. Classification of Aplodontidae

Rensberger (1975) was the first to include the Prosciurinae in the Aplodontidae. He subdivided the Aplodontinae into three subfamilies: Prosciurinae, Allomyinae and Aplodontinae. However, Schmidt-kittler and Vianey-Liaud (1979) were unsatisfied with Rensberger's too strongly horizontal classification and proposed to combine the first two subfamilies into one, Allomyinae (sensu lato). In this case Allomyinae should include 8 genera: *Cedromus Pelycomys, Prosciurus, Plesispermophilus, Sciurodon, Haplomys, Allomys* and *Downsimus*, but Schmidt-Kittler and Vianey-Liaud excluded *Ameniscomys, Meniscomys, Niglarodon* and *Sewelleladon*, which were members of Rensberger's Allomyinae (s. S.), from the family. Later the last three genera, that is, without *Ameniscomys*, were grouped in a new subfamily Meniscomyinae by Ren-

sberger (1981). In 1983 Rensberger transferred *Plesispermophilus* from Prosciurinae to Allomyinae. At about the same time Wang and Heissig (1984) expressed a similar opinion that supported by Rensberger.

In fact Prosciurinae differs from Allomyinae and Maniscomyinae not only in its primitive characters: brachyodonty, lack of ectoloph and weak lophs, but also in its derived characters, such as antero-posteriorly compressed paracone and metacone, more straight protoloph and metaloph, the lingually extending mesostyle. It is obvious that Prosciurinae represents a branch distinct from Allomyinae and Meniscomyinae, and deserves to be treated as a separate subfamily of aplodontids as pointed out by Rensberger. *Plesispermophilus* should also be included in Allomyinae, because it shared a series of derived characters common to Allomyinae.

2. Relationship between *Haplomys* and other aplodontids.

Haplomys, a primitive genus of aplodontids, was first included in Allomyinae by Rensberger (1971). However, later Rensberger did not mention this genus again while discussing the affinity of Allomyinae in 1981 and 1983. During the study of the aplodontids from Nei Mongol the present author compares *Haplomys* with other primitive aplodontids. It is evident that *Haplomys* differs not only from Prosciurinae in possessing ectoloph, but also from *Promeniscomys* in having W-shaped ectoloph, vaulted mesostyle, central fossette extending into mesostyle or even intersecting the ectoloph behind mesostyle. All these characters are nothing else but derived characters of Allomyinae. It appears to the author that *Haplomys* may well be a primitive member of the Allomyinae.

3. The affinity of the Asian Oligocene aplodontids

Up to now, four genera representing 3 subfamilies have been recorded from the Asian Oligocene: *Prosciurus* (Prosciurinae), *Haplomys, Plesispermophilus* (Allomyinae) and *Promeniscomys* (Meniscomyinae). It shows that Aplodontidae had already split into three branches in Middle Oligocene of Asia. Meniscomyinae had long been believed to be restricted to North America. The discovery of *Promeniscomys,* the most primitive member of the Meniscomyinae, from the Middle Oligocene of China shows that the family appeared also in Asia. Its early occurrence in Asia, in the Middle Oligocene, makes it reasonable to assume that the Meniscomyinae originated in Asia and later emigrated into North America.

Haplomys is a genus of Later Oligocene of North America. If *Prosciurus arboraptus* can really be included in the genus *Haplomys,* it will provide us with strong evidence that *Haplomys* was not autochthonous and endemic in North America but originated from Asia and emigrated into North America.

After Having excluded *Prosciurus lohiculus* (= *Anomoemys lohiculus* (see Wang, 1986)) and *Prosciurus arboraptus* (= *Haplomys arboraptus*) from *Prosciurus,* there remains only one species of *Prosciurus* known from China: *Prosciurus? shantungensis* from the Middle Tertiary of Shandong Province. The discovery of *Prosciurus ordosicus* adds new information to our knowledge of this genus in China. *Prosciurus* existed in China as early as in Middle Oligocene.

As mentioned above, three of the four aplodontid genera from Asian Oligocene are closely related to those of North America, but have not been found in Europe. Only one genus, *Plesispermophilus,* may serve as a common form for both Asia and Europe. The above listed facts demonstrated that the relationship between the Asian and North American Oligocene aplodontids is closer than that between Asian and European ones.

4. The systematic position of *Selenomys*

Selenomys was described and arranged in Cricetopidae By Matthew and Granger (1923).

Simpson (1945) considered Cricetopidae as a subfamily, Cricetopinae, of Cricetidae. Stehlin and Schaub (1951) put *Selenomys* under Cricetidae incertae sedis. However, Mellett (1966, 1968) pointed out that *Selenomys* is similar to the Aplodontidae in lower jaw and tooth morphology and should be referred to Aplodontidae. Kowalski (1974) followed Mellett's opinion.

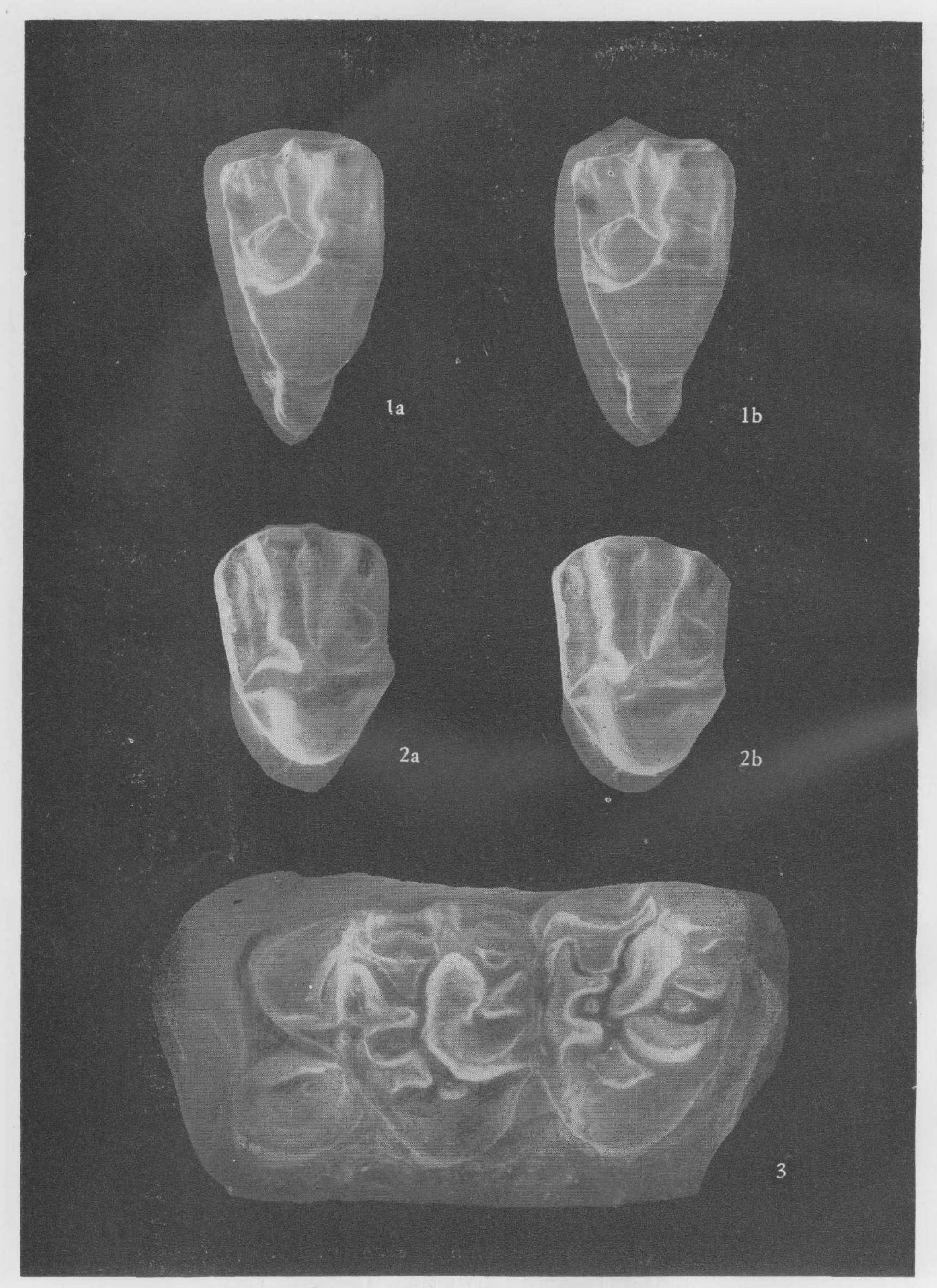
As far as the present author can judge, *Selenomys* is quite different from Aplodontidae in cranial morphology, it is similar to the Cricetidae in the above listed characters. It would be better to keep *Selenomys* in the Cricetidae.

5. The Nomenclature problem

Saint-Jacques is a small town of Dengkou county, Bayannur League, Nei Mongol, and is located on the western bank of the Ye'low River. While exploring along the Yellow River in 1923, Teilhard de Chardin and Licent encountered some fossiliferous beds on the eastern bank of the river, just opposite to Saint-Jacques. So they called the area Saint-Jacques and thought the beds belonging to Pliocene. After having examined the fossil mammals they (Teilhard de Chardin et al., 1924c) changed their original opinion and transferred the beds to Oligocene. Since then, Saint-Jacques has been regarded as one of the classic Oligocene localities in Asia. However, no formal lithostratigraphic unit name has been given to it. In addition, where the Oligocene beds expose belongs now to Hanggin Banner, Ih Ju League, Nei Mongol not to Dengkou county. As a result the concept of Saint-Jacques beds has long been obscure.

In 1977 and 1978 an extensive exploration was carried out. It revealed that the beds explored previously by Teilhard de Chardin et Licent in 1923 represent only a small portion of a whole series of deposits. Futhermore, the structure in the area is rather complicated. Therefore, it is diffficult to define a formal lithostratigraphic unit based on the beds exposed in Saint-Jacques area.

In the Qianlishan district, which constitutes the western marginal region of Ordos and is over 20 km. south of Saint-Jacques, the exposure of the Oligocene sediments is excellent. The sediments are rich in mammalian fossils and provided with more or less complete sections. Based on lithology, two formations, Wulanbulage Formation and Yikebulage Formation, were named by Wang et al. in 1981. Wulanbulage Formation is considered as of Middle Oligocene, based on the fossil mammals contained. It can be further subdivided into two members. The lower member consists of dark red-purple mudstone and clayish siltstone with orange sandstone intercalations. The lithology of the upper one is greyish orange sandstone with a few conglomerate Yikebulage Formation consists of brownish red sandy and silty mudstone, light orange sandstone, sandy gravel intercalated with layers of brownish red mudstone. Its age is determined as Late Oligocene. Detailed comparison of the lithology and the fossil mammals present in both areas shows that "Saint-Jacques" is similar in lithology to that of the lower member of Wulanbulage Formation and its fossil mammal assemblage is like that of Wulanbulage Formation. It seems thus the beds in both areas may be of the same lithostratigraphic unit of the same age and the beds of "Saint-Jacques" represent only a part of the Wulanbulage Formation.



1a，1b，*Haplomys arboraptus*. 右 M^2（V 7958）嚼面立体照片×17；

2a，2b，鄂尔多斯原松鼠(新种) *Prosciurus ordosicus* sp. nov. 正型标本：左 $M^{1/2}$（V 7959），嚼面立体照片，×16；

3.中国原新月鼠(新属、新种) *Promeniscomys sinensis* gen. et sp. nov. 正型标本：左 P^3—M^1（V 7957），嚼面，约×20(照片比例稍变形拉长)